

Landsat 7 Processing System (LPS) Build Implementation Plan

September 1996

**GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND**

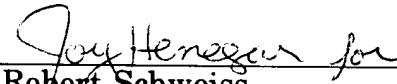
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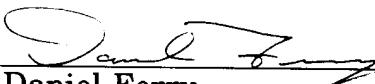
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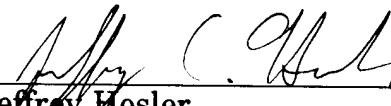
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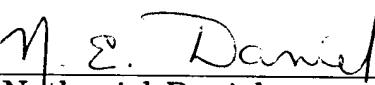
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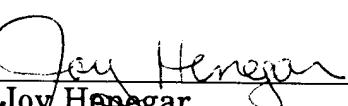
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Abstract

This document contains the software build implementation plan for the Landsat 7 Processing System (LPS). The allocation of software to builds is based on an analysis of the requirements contained in the LPS Functional and Performance Specification (F&PS) and the LPS Operations Concept documents. The software available for reuse from prior development, including LPS prototypes, and the sizing of new development were also considered in allocating software to builds.

Keywords:

Landsat 7
Landsat 7 Processing System (LPS)
Landsat 7 Ground Station (LGS)
Land Processes Distributed Active Archive Center (LP DAAC)
Functional and Performance Specification (F&PS)
Mission Operations and Data Systems Directorate (MO&DSD)
Systems Management Policy (SMP)
Mission Operations and Systems Development Division
(MOSDD)

Preface

This document contains the build implementation plan for the LPS software. The implementation is based on information contained in the LPS F&PS, the LPS System Design Specification, the LPS Operations Concept document, the LPS Software Requirements Specification, and the LPS Detailed Design Specification.

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Table of Contents

SECTION 1 -- INTRODUCTION

1.1	Scope.....	1-1
1.2	Reference Documents	1-1

SECTION 2 --- OVERVIEW

2.1	LPS Overview.....	2-1
2.2	Build Process.....	2-1

SECTION 3 --- BUILD PLAN

3.1	Build/Release Capabilities and Rationale	3-1
3.2	LPS Build Schedule.....	3-6
3.3	Resources Required.....	3-7
3.3.1	LPS System Hardware.....	3-7
3.3.2	Test Tools and Data	3-9
3.3.3	Commercial Off-the-Shelf Software	3-10

Appendix A — Mapping of Requirements to Builds

Appendix B — Development Area Lines of Code Estimates

Appendix C — Mapping of Units to Builds

Appendix D— Acronyms and Abbreviations

List of Figures

Figure 3-1: Development Environment.....	3-8
Figure 3-2: LPS Hardware Allocation Timeline.....	3-9

List of Tables

Table 3-1: Function Allocation Per Build/Release.....	3-2
Table 3-2: LPS Implementation Schedule.....	3-6
Table 3-3: COTS License Allocation.....	3-10
Table C-1: Globals Units-to-Builds Mapping.....	C-1
Table C-2: Database Units-to-Builds Mapping	C-2
Table C-3: MACS Units-to-Builds Mapping.....	C-3
Table C-4: RDCS Units-to-Builds Mapping.....	C-5
Table C-5: RDPS Units-to-Builds Mapping.....	C-6
Table C-6: MFPS Units-to-Builds Mapping.....	C-7
Table C-7: PCDS Units-to-Builds Mapping.....	C-8
Table C-8: IDPS Units-to-Builds Mapping.....	C-10
Table C-9: LDTS Units-to-Builds Mapping	C-11
Table C-10: Analysis Tools Units-to-Builds Mapping.....	C-13

SECTION 1 -- INTRODUCTION

1.1 Scope

This build/release plan documents the approach used by the Mission Operations and Systems Development Division (MOSDD) of the Mission Operations and Data Systems Directorate (MO&DSD) at the National Aeronautics and Space Administration's (NASA's) Goddard Space Flight Center (GSFC) in implementing the subsystems of the Landsat 7 Processing System (LPS). It describes the build methodology that will be used to implement the subsystem capabilities, provides the detailed build/release functional contents, and maps the requirements and units to the various builds/releases. The implementation schedule is based in part on the requirements for the LPS to support the Landsat 7 Ground System test schedules.

1.2 Reference Documents

The following documents contain background and/or detailed information which was referenced in creating the LPS Build Implementation Plan.

1. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) Functional and Performance Specification, Revision 1, 560-8FPS/0194, July 14, 1995
2. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) Operations Concept, Revision 2, 560-30CD/0194, April 15, 1996
3. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) System Design Specification, 560-8SDS/0194, May 26, 1995
4. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) Software Requirements Specification, 560-8SWR/0195, April 28, 1995
5. Wayne Gustafson (NASA), L-7 Ground System Master Schedule, September 15, 1995
6. EOSDIS Core System Project, Science Data Processing Segment (SDPS) Integration and Test Plan for the ECS Project Volume 2: Release A 319-CD-005-002, March 1995
7. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) System Integration and Test Plan, 514-2ITP/0195, October 1995

8. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) Detailed Design Specification, 514-4DDS/0195, October 1995

SECTION 2 --- OVERVIEW

2.1 LPS Overview

The LPS is a major component of the Landsat 7 system and is located, along with the Landsat 7 Ground Station (LGS) and the Land Processes Distributed Active Archive Center (LP DAAC), at the Earth Resources Observation System Data Center (EDC). The LPS coordinates its operations with the LGS in accordance with the Landsat 7 contact period schedules to receive the return link wideband data in real-time from all four output channels of the LGS into its four wideband data stores, one per LPS string. Each LPS string retrieves the received wideband data from its wideband data store and processes it at a rate equal to or greater than 7.5 Mbps, generates Level 0R, browse, and metadata files (collectively called the LPS files), and makes the LPS files available for transfer to the LP DAAC. The LPS also generates return link data quality and accounting information from the wideband data received and provides that information as part of the metadata to the LP DAAC. LPS receives the equivalent of 250 ETM+ scenes of wideband data from LGS, saves the data in 30-day storage, processes the data to LPS files, and provides the files to LP DAAC on a daily basis. The LPS also provides a fifth spare string to be used as backup for any one of its four primary strings.

2.2 Build Process

The LPS will be implemented in three incremental builds. Build 1 software is implemented and tested through verification of system requirements but not formally released to the customer. Each subsequent build consists of the new functionality assigned to that build plus the software from the previous build. LPS Release 1 combines Build 1 and Build 2 software for factory acceptance and operational testing; Build 3/Release 2 software completes the LPS as defined in the system requirements.

SECTION 3 --- BUILD PLAN

3.1 Build/Release Capabilities and Rationale

LPS implementation is performed in three builds and two releases. Table 3-1 summarizes the functions developed in each build and release. Appendix A maps requirements to builds. Appendix B lists the lines of code estimates for each build. Appendix C maps units to builds.

Build 1 supports instrument integration and test; Build 2/Release 1 supports spacecraft integration and test and external interfaces, including the LGS and the LP DAAC; Build 3/Release 2 satisfies all LPS system level requirements.

Build 1 capabilities include raw wideband data capture, limited level 0R processing, and Data Availability Notice (DAN) file generation. Level 0R processing capabilities include transfer frame processing, Bose-Chaudhuri-Hocquenghem (BCH) error detection and correction, fill Channel Access Data Unit (CADU) identification, Enhanced Thematic Mapper Plus (ETM+) major frame construction, subinterval determination, Mirror Scan Correction Data (MSCD) file creation, and the collection of return link and level 0R quality and accounting on contact and subinterval bases, respectively. LPS processes are invoked from a UNIX shell. Status and error messages are logged to a journal file. Messages can be viewed as they are written to the journal file or browsed at any time thereafter using UNIX system utilities. The LPS/LGS interface for raw wideband data capture is available. The electronic interface with the LP DAAC is not available, but sample DAN files can be examined for correct format.

Build 2/Release 1 provides an end-to-end working system. Build 2/Release 1 capabilities include calibration, band, and Payload Correction Data (PCD) file generation, Worldwide Reference System (WRS) scene identification, corner coordinate computations for full WRS scenes, partial metadata file generation, and the complete file transfer protocol between the LPS and the LP DAAC. Build 2/Release 1 includes the LPS Graphical User Interface (GUI) for manual data capture, level 0R processing, and status and error message display. All menu options are present, though many are not functional. Build 2/Release 1 includes implementation of approved Configuration Change Requests (CCRs) for problem resolution or design changes. Release 1 is the first release delivered to EDC.

Software prototyped for the LPS or reused from previous development (e.g., BCH, Cyclic Redundancy Check, and Reed-Solomon error detection and

Table 3-1. Function Allocation Per Build/Release (1 of 4)

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
General		Approved enhancements and problem correction	Approved enhancements and problem correction
	Common Basic Database Routines		
		Common Database Subinterval & Scene Information Extraction	
		Common FIFO Routines	
	Common Process Routines		
	Common Semaphore Routines		
	Common Shared Memory Routines		Enhanced Shared Memory Routines
	Common Time Routines	Additional Time Comparison Routines	
	Log Message Routines		
User Interface			Automatic Processes Enable/Disable Forms
		Browse LPS Journal	
			Control DAN Transfer Form
		Display LPS Status/Error Messages	
			LPS Configuration View/Edit Form
			Level 0R Error Thresholds View/Edit Forms
			Level L0R Parameters View/Edit Forms
		Main Menu	
			Manage Output Files Form
		Manual Data Capture Start/Stop Forms	
		Manual Level 0R Processing Start/Stop Forms	
			Report Generation Forms
			Tape Label Generation Form

Table 3-1. Function Allocation Per Build/Release (2 of 4)

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
Database			Back-up Script Fine Tuning Indexing Performance
	Table Generation Scripts	Table Generation Scripts	Table Generation Scripts
Management and Control			Additional Startup/Shutdown Automatic Processes (Capture, Level 0R, Save to Tape) Check Parameter Consistency Across Strings Electronic Contact Schedule Ingest Electronic IAS Parameter File Ingest LPS Q/A Report Generation Metadata File Generation (Partial) Metadata File Generation (Full) Propagate Parameters to Other Strings Scripts to Configure before/after Tests
	Top-Level Level 0R Processing Routines		
Raw Data Capture	Capture Raw Wideband Data		Delete Raw Data Files Generate Data Receive Summary Report Generation Generate Tape Labels Maintain Accounting in Database Modify Capture Process Execution Characteristics Playback Data Restage Data Save to Tape Suspend Level 0R during Capture

Table 3-1. Function Allocation Per Build/Release (3 of 4)

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
Raw Data Processing	Align Bytes BCH EDAC CCSDS Parameters Deinvert Data Detect VCID Change Error Thresholds Failed CADU Trouble File Identify Fill CADUS Perform CRC Check Perform PN Decode Perform RS EDAC Perform SCLF CADU Sync		
Major Frame Processing		Align Bands Calibration File Generation	
	Collect Quality and Accounting on a Subinterval Basis Determine Subintervals		
		Deinterleave and Reverse Bands	Error Thresholds
	Extract Major Frame Time		
		Extract PCD Bytes	
	Identify Major Frame Identify VCDUs MSCD File Generation		
		Revise Major Frame Identification	
		Use Parameters from Database	
			Use Two-Byte Fill Pattern
Payload Correction Data Processing		Build PCD Cycles Create PCD File	
		Identify WRS Scene Centers by Interpolation	Extrapolate Partial Scene Centers

Table 3-1. Function Allocation Per Build/Release (4 of 4)

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
Payload Correction Data Processing (continued)		Compute Actual Corner Lat/Lon for Full Scenes	Compute Actual Corner Lat/Lon for Partial Scenes
			Compute HDS, Sun Azimuth & Elevation
			Error Thresholds
			Report Bands Present
		Report Scene Metadata	
		Use Parameters from Database	
Image Data Processing			Automatic Cloud Cover Assessment
		Band File Generation	
			Browse File Generation
			Moving Window Display
		Report Band Metadata	
			Report Browse/ACCA Metadata
			Use Parameters from Database
LPS Data Transfer		Complete File Transfer Protocol	
			Delete Transferred Output Files
			File Transfer Summary Report Generation
	Generate DAN		
			Mark Output Files for Retention
			Transmit Suspended DANs
			Timeout on DDN Receipt

correction; LP DAAC electronic interface) is incorporated in the first two builds.

Build 3/Release 2 incorporates the moving window display, browse file generation and the generation of a complete metadata file (cloud cover assessment, horizontal display shift, etc.) Level 0R processing is controlled by parameters and error reporting thresholds stored in the LPS database. Raw wideband data capture includes special, setable process execution characteristics (e.g., executing on a restricted processor) to enhance performance. Raw data can be saved to tape and restaged. Raw data can be

played back to another LPS string for testing. Contact schedules from the LGS and Image Assessment System (IAS) parameter files can be ingested. LPS output files can be manually deleted or marked for retention. Automatic processes capture data on schedule, invoke level 0R processing, and save the raw file to tape. The LPS GUI allows for the control of all automated processes and for the inspection and modification of string configurations and processing parameters. Scripts are provided to back up the LPS databases and to propagate parameters from one LPS string to other strings. All approved CCRs are implemented, and all LPS requirements are satisfied by the completion of Build 3 implementation.

Verification of LPS performance requirements is addressed early in the development life cycle. The implementation planned for LPS allows for some verification of performance requirements starting with Build 1 at the module test level. Performance testing continues throughout Build 2/Release 1 and in Build 3/Release 2 the system meets all LPS system level performance requirements.

3.2 LPS Build Schedule

Table 3-2 is the LPS schedule from the beginning of Build 1 implementation through LPS site installation at EDC.

Table 3-2: LPS Implementation Schedule

<u>Scheduled Start</u>	<u>Scheduled Finish</u>	<u>Description</u>
11/01/95	04/26/96	Build 1 Implementation
04/29/96	09/04/96	Build 1 System Test
04/01/96	11/08/96	Build 2 Implementation
11/13/96	01/20/97	Build 2 System Test
11/08/96	04/21/97	Build 3 Implementation
01/20/97	01/20/97	Release 1
04/21/97	06/23/97	Build 3 System Test
06/23/97	06/23/97	Release 2
04/21/97	06/23/97	Factory Acceptance Test
06/23/97	07/31/97	EDC Site Installation

Note that Build 3/Release 2 system testing and factory acceptance testing occur simultaneously.

3.3 Resources Required

This section describes the system hardware, test resources, and allocation of major Commercial Off-the-Shelf (COTS) software for the LPS implementation.

3.3.1 LPS System Hardware

Figure 3-1 shows the LPS hardware development environment, including those elements resident at GSFC and those resident at the Consolidated Network Management and Operations Support (CNMOS) contract Greentec IV facility.

Figure 3-2 shows the allocation timeline for the major LPS system hardware during development and system test. This allocation assumes that the additional three Silicon Graphics Incorporated Challenge XL computers will not be made available for development or testing until at the earliest the end of Build 1. At that time they can be used for system testing and/or acceptance testing.

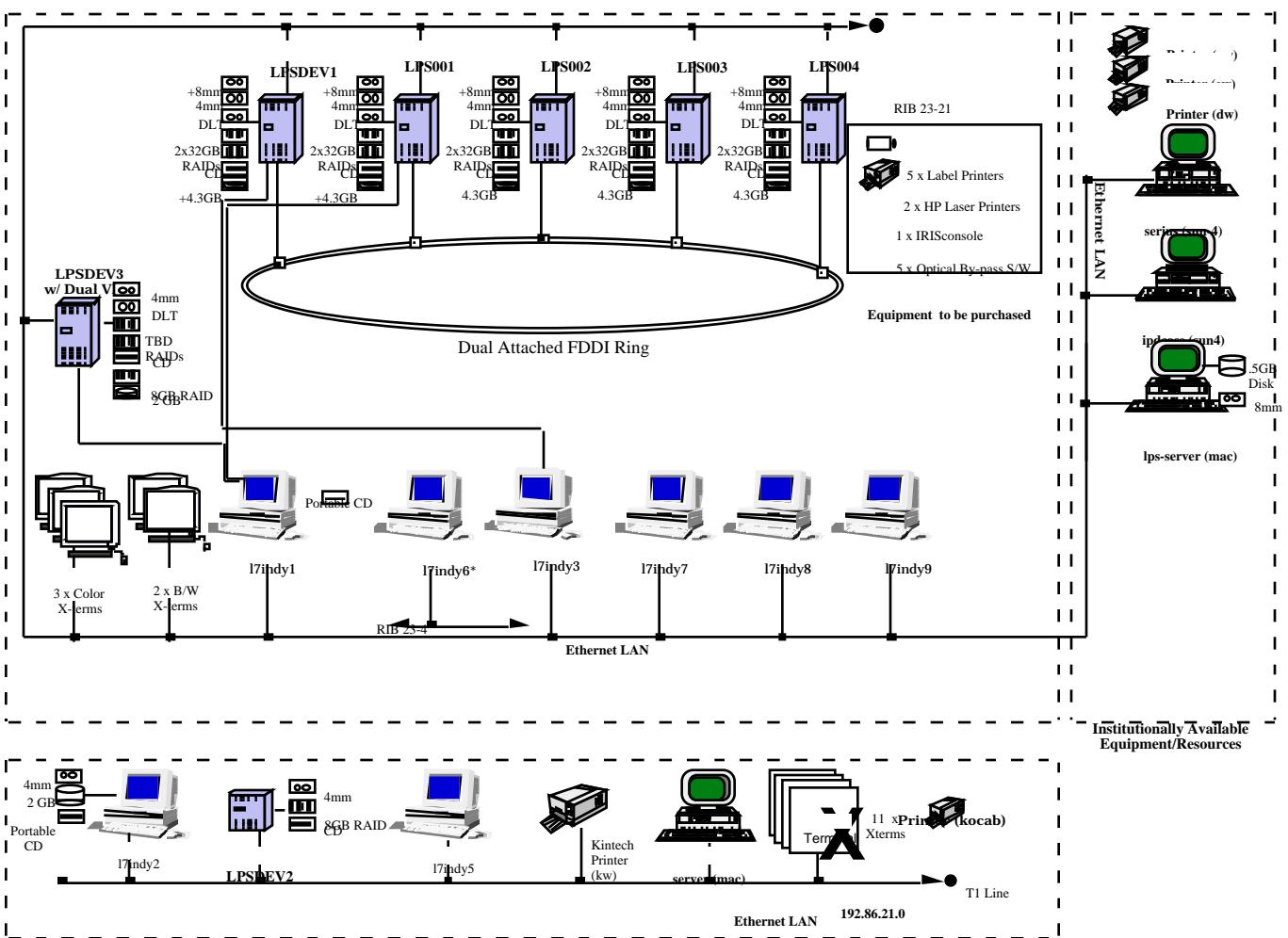
Figure 3-2 shows how the various development and test activities overlap and how the hardware is allocated to the development team, the hardware prototype effort, and system test [which in this context includes formal Configuration Management (CM)]. The intent of this allocation is to provide ample resources for developers while providing sufficient resources for hardware prototyping, system testing, and acceptance testing.

LPSDEV1 (Challenge XL) and LPSDEV2 (Challenge L) are allocated for software development throughout the entire development process. The allocation of LPSDEV2 for CM libraries and software development is based on the assumption that this computer will be physically resident at the CNMOS Greentec IV facility. LPSDEV3 (Challenge XL with dual Versa Module European buses) is allocated for hardware prototyping and for system test until the end of Build 2. At that time it can be used for software development or system testing as needed, with any additional hardware prototyping occurring on a scheduled basis.

LPS001 (Challenge XL) is allocated for system test throughout the development and system testing process. LPS002 is allocated for integration and test except when required for system test. LPS003 is allocated for system test and for EDC access to LPS Release 1 software prior to Build 3 system test. At other times it is available. LPS004 is allocated for system test. At other times it is available.

At least two strings are necessary to test raw data capture: one to send the data and the second to receive it. During Build 1, since only a limited

R. Schweiss 04/01/96

**LPS Development: Hardware Configuration @ CSC GT-IV**

* indicates not located in Rms. W322A&B + indicates on order # indicates to be ordered

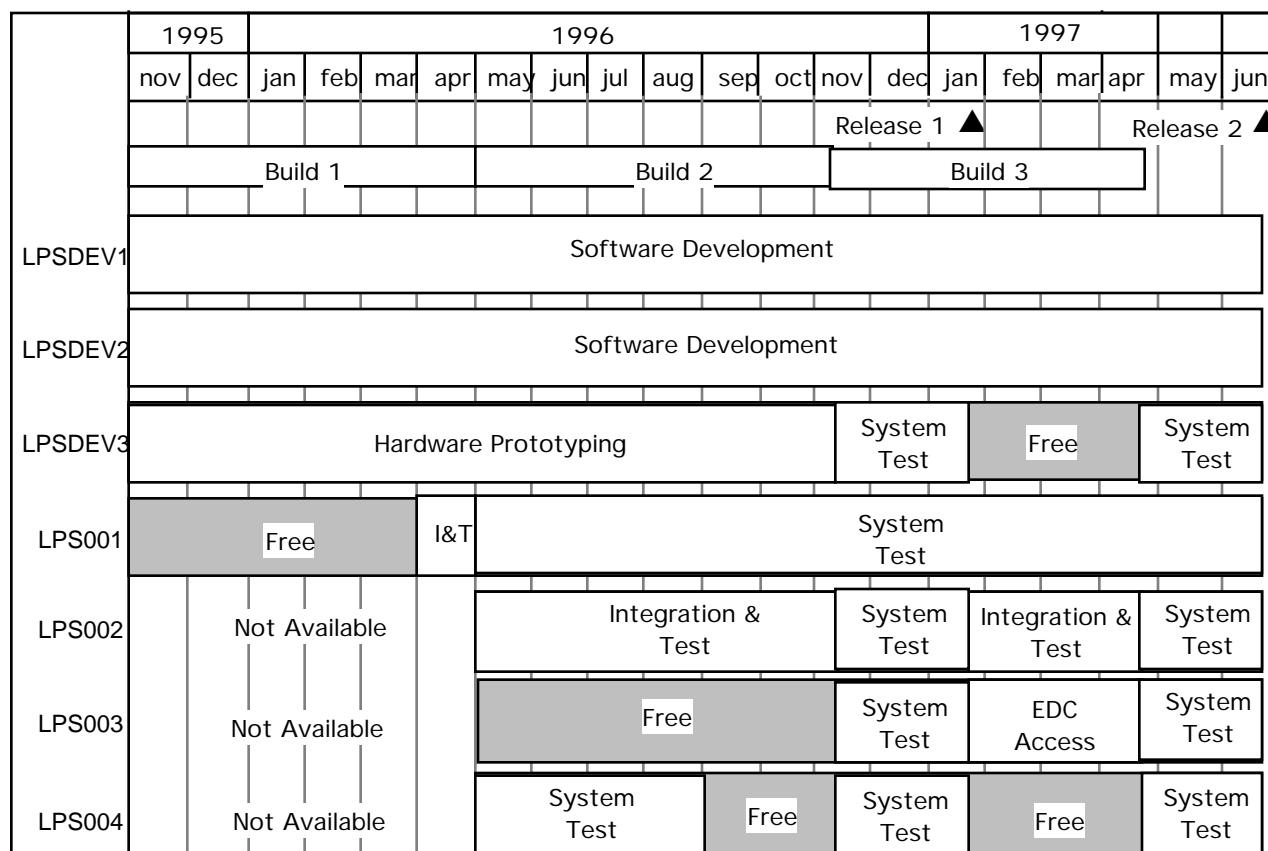


Figure 3-2: LPS Hardware Allocation Timeline

number of Challenge XL computers are available, software personnel, system test personnel, and hardware prototyping personnel must coordinate to test raw data capture.

The LPS hardware must be accessible to the implementation and test teams 24 hours a day, 7 days a week. Access on evenings and weekends will be provided via a small number of keys. Development terminals, printers and network connections must be available to the LPS team members at the CNMOS Greentec IV facility and at GSFC.

3.3.2 Test Tools and Data

Raw wideband data will be provided by the Generic Telemetry SIMulator (GTSIM) for both nominal and limited data error conditions. A test tool will be developed by the LPS team to modify data to insert errors outside the scope of GTSIM production. Additional Landsat 7 data will be available

from spacecraft and instrument tests. Data containing fill in critical areas (PCD, time codes) will require a tool to insert valid data in place of fill.

Test drivers/stubs will be written to simulate subsystem processes not implemented in Build 1; tools to dump data from shared memory and to produce formatted dumps of LPS files will also be developed.

In addition to interface testing with external facilities, tests will be run with interface simulators to eliminate schedule dependency on external Landsat 7 ground system elements.

Tools and data should be available for Build 1 testing. Both will be used for unit, module, subsystem and system test, and may be provided to the customer for acceptance and operational test use.

Test tools and data are addressed in more detail in the Landsat 7 Processing System (LPS) Integration and Test Plan.

3.3.3 Commercial Off-the-Shelf Software

Table 3-3 allocates COTS licenses across the development computers. The allocation is based on the assumption that the Challenge L computer will be physically resident at the CNMOS Greentec IV facility.

Table 3-3: COTS License Allocation

Computer	Oracle Server	Developer 2000	SQLPlus	Proc*C	CaseVision Workshop	Purify
LPSDEV1	1	1	1	1	10	4
LPSDEV2	1	18	18	18	10	4
LPSDEV3	1	1	1	1	1	0
LPS001	1	1	1	1	1	0
LPS002	1	1	1	1	1	0
LPS003	1	1	1	1	1	0
LPS004	1	1	1	1	1	0
Total	7	24	24	24	25	8

Appendix A — Mapping of Requirements to Builds

The following table maps the LPS system requirements specified in reference document 1 to the LPS software requirements specified in reference document 4 and the latter to the builds in which the requirements are satisfied (i.e. fully testable). Some F&PS requirements are not allocated to software and therefore not mapped to software requirements. Points where the requirements mapping is incomplete are designated To Be Mapped (TBM).

System Requirement Number	Software Requirement Number	Software Requirement Name	Build
3.1.1		[SYSTEM LEVEL REQUIREMENT]	
3.1.2		[SYSTEM LEVEL REQUIREMENT]	
3.1.3		[SYSTEM LEVEL REQUIREMENT]	
3.1.4	2.2.1	Perform SCLF Sync	1
3.1.4	2.2.2	Align Bytes	1
3.1.4	2.2.3	Deinvert Data	1
3.1.4	2.2.4	Perform PN Decode	1
3.1.4	2.3.1	Perform CRC Check	1
3.1.4	2.3.2	Perform RS_EDAC Check	1
3.1.4	2.3.3	Discard Fill CADUs	1
3.1.4	2.4	Decode BCH	1
3.1.4	2.5	Annotate VCID Change	1
3.1.4	2.6	Compute BER	3
3.1.5	5.3	Generate Band File	2
3.1.5	6.2	Generate Metadata	3
3.1.5	3.5.2	Align Bands	2
3.1.5	5.2.1	Reduce Image by Subsamples	3
3.1.5	5.2.2	Reduce Image by Wavelets	3
3.1.6	2.1	Validate RDP Parameters	3
3.1.6	2.4	Decode BCH	1
3.1.6	2.6	Compute BER	3
3.1.6	2.7	Generate Return Link QA Report	3
3.1.6	2.3.1	Perform CRC Check	1
3.1.6	2.3.2	Perform RS_EDAC Check	1
3.1.7	3.7	Generate Level 0R QA Report	3
3.1.8	6.1	Process LPS Directive	2
3.1.9		[RENUMBERED]	
3.1.10	6.7	LPS System Control	3
3.1.10.1	6.7	LPS System Control	3
3.1.10.1	6.7	System Start-up	1
3.1.10.2	TBM	System Shut-down	1
3.1.10.3	2.1	Validate RDP Parameters	3
3.1.10.3	2.4	Decode BCH	1

System Requirement Number	Software Requirement Number	Software Requirement Name	Build
3.1.10.3	2.6	Compute BER	3
3.1.10.3	6.3	Report LPS Status	2
3.1.10.3	2.2.1	Perform SCLF Sync	1
3.1.10.3	2.3.1	Perform CRC Check	1
3.1.10.3	2.3.2	Perform RS_EDAC Check	1
3.1.10.4	6.8	Monitor System Faults	2
3.1.10.5	6.8	Monitor System Faults	2
3.1.10.6	TBM	Test LPS functions & external I/Fs	3
3.1.10.7	TBM	Execute Diagnostic Tests	3
3.1.10.8	TBM	Support End-to-End Testing	3
3.1.11	2.1	Validate RDP Parameters	3
3.1.11	6.1	Process LPS Directive	2
3.1.11	6.3	Report LPS Status	2
3.1.11	2.2.1	Perform SCLF Sync	1
3.1.11	2.2.1	Align Bytes	1
3.1.11	2.2.3	Deinvert Data	1
3.1.11	2.2.4	Perform PN Decode	1
3.1.12	2.1	Validate RDP Parameters	3
3.1.12	2.4	Decode BCH	1
3.1.12	2.6	Compute BER	3
3.1.12	6.3	Report LPS Status	2
3.1.12	2.2.1	Perform SCLF Sync	1
3.1.12	2.3.1	Perform CRC Check	1
3.1.12	2.3.2	Perform RS_EDAC Check	1
3.1.14	6.5	6.1 Modify LPS Configuration	3
3.1.15		[RENUMBERED]	
3.1.16		[RENUMBERED]	
3.1.17		[RENUMBERED]	
3.1.18		[RENUMBERED]	
3.1.19	6.3	Report LPS Status	2
3.1.20		[SYSTEM LEVEL REQUIREMENT]	
3.1.21		[SYSTEM LEVEL REQUIREMENT]	
3.1.22		[SYSTEM LEVEL REQUIREMENT]	
3.1.23		[SYSTEM LEVEL REQUIREMENT]	
3.2.1	TBM	Interface with LGS	3
3.2.2	7.2	Send DAN	2
3.2.2	7.4	Transfer Files	2
3.2.3		[ALLOCATED TO OPERATIONS]	
3.2.4	TBM	IAS Parameter Ingest	3
3.3.1.1	1.1	Receive Raw Wideband Data	3
3.3.1.1	1.5	Delete Raw Wideband Data	3
3.3.1.2	1.1	Receive Raw Wideband Data	3
3.3.1.2	1.5	Delete Raw Wideband Data	3
3.3.1.3	1.1	Receive Raw Wideband Data	3

System Requirement Number	Software Requirement Number	Software Requirement Name	Build
3.3.1.3	1.5	Delete Raw Wideband Data	3
3.3.1.4	1.1	Receive Raw Wideband Data	3
3.3.1.4	1.5	Delete Raw Wideband Data	3
3.3.1.4	2.3.1	Perform CRC Check	1
3.3.1.4	2.3.2	Perform RS_EDAC Check	1
3.3.1.4	2.3.3	Discard Fill CADUs	1
3.3.1.5	TBM	Retrieve Raw Wideband Data on a Contact Period Basis	1
3.3.1.6	TBM	Retrieve Raw Wideband Data on an Output Channel Basis	1
3.3.1.7	1.2	Save Raw Wideband Data	3
3.3.1.8	1.2	Save Raw Wideband Data	3
3.3.1.9	1.3	Restage Raw Wideband Data	3
3.3.1.10	1.4	Generate Data Receive Summary Report	3
3.3.1.10.1		[ALLOCATED TO OPERATIONS]	
3.3.1.11		[ALLOCATED TO OPERATIONS]	
3.3.1.12	1.1	Receive Raw Wideband Data	3
3.3.2.1	2.3.1	Perform CRC Check	1
3.3.2.1	2.3.2	Perform RS_EDAC Check	1
3.3.2.1	2.3.3	Discard Fill CADUs	1
3.3.2.2	2.2.1	Perform SCLF Sync	1
3.3.2.3	2.2.1	Perform SCLF Sync	1
3.3.2.3	2.2.2	Align Bytes	1
3.3.2.3	2.2.3	Deinvert Data	1
3.3.2.4	2.2.1	Perform SCLF Sync	1
3.3.2.5	2.2.3	Deinvert Data	1
3.3.2.6	2.2.1	Perform SCLF Sync	1
3.3.2.7	2.2.4	Perform PN Decode	1
3.3.2.8	2.3.1	Perform CRC Check	1
3.3.2.8	2.3.2	Perform RS_EDAC Check	1
3.3.2.9	2.4	Decode BCH	1
3.3.2.9.1	2.4	Decode BCH	1
3.3.2.10	2.4	Decode BCH	1
3.3.2.11	2.5	Annotate VCID Change	1
3.3.2.11	3.4.4	Determine Subintervals	1
3.3.2.12	2.3.3	Discard Fill CADUs	1
3.3.2.12	TBM	Delete Fill VCDUs	1
3.3.2.13	2.4	Decode BCH	1
3.3.2.13	2.6	Compute BER	3
3.3.2.13	2.2.1	Perform SCLF Sync	1
3.3.2.13	2.3.1	Perform CRC Check	1
3.3.2.13	2.3.2	Perform RS_EDAC Check	1
3.3.2.13	3.4.3	Collect VCDU Quality and Accounting	1
3.3.2.14	3.4.1	Identify Major Frames	1
3.3.2.15	3.4.1	Identify Major Frames	1

System Requirement Number	Software Requirement Number	Software Requirement Name	Build
3.3.2.16	3.5.1	Deinterleave and Reverse Bands	2
3.3.2.17	3.5.1	Deinterleave and Reverse Bands	2
3.3.2.18	3.5.1	Deinterleave and Reverse Bands	2
3.3.2.19	3.5.1	Deinterleave and Reverse Bands	2
3.3.2.19	3.5.2	Align Bands	2
3.3.2.20	3.6.3	Extract MSCD Data	1
3.3.2.21	3.6.4	Extract Calibration Data	2
3.3.2.22	3.5.2	Align Bands	2
3.3.2.23	3.4.4	Determine Subintervals	1
3.3.2.24	5.3	Generate Band File	2
3.3.2.24	3.5.1	Deinterleave and Reverse Bands	2
3.3.2.24	3.5.2	Align Bands	2
3.3.2.25	4.6	Create PCD File	2
3.3.2.25	5.3	Generate Band File	2
3.3.2.25	3.6.1	Create MSCD File	1
3.3.2.25	3.6.3	Extract MSCD Data	1
3.3.2.25	5.2.1	Reduce Image by Subsamples	3
3.3.2.25	5.2.2	Reduce Image by Wavelets	3
3.3.2.26	3.2	Identify VCDUs	1
3.3.2.26	3.4.1	Identify Major Frames	1
3.3.2.26	3.4.3	Collect VCDU Quality and Accounting	1
3.3.2.26	3.4.4	Determine Subintervals	1
3.3.2.27	4.5	Extract Major Frame Info	3
3.3.2.27	5.3	Generate Band File	2
3.3.2.28	5.3	Generate Band File	2
3.3.2.28	3.5.2	Align Bands	2
3.3.2.29	4.4.1	Compute Position MJF Time	1
3.3.3.1	5.2.1	Reduce Image by Subsamples	3
3.3.3.1	5.2.2	Reduce Image by Wavelets	3
3.3.3.2		[DELETED]	
3.3.3.3	5.2.1	Reduce Image by Subsamples	3
3.3.3.3	5.2.2	Reduce Image by Wavelets	3
3.3.3.4	5.2.1	Reduce Image by Subsamples	3
3.3.3.5	5.2.1	Reduce Image by Subsamples	3
3.3.3.5	5.2.2	Reduce Image by Wavelets	3
3.3.4.1	4.2.1	Extract Info Word	2
3.3.4.2	3.3	Extract PCD	2
3.3.4.2	4.3.1	Assemble Minor Frames	2
3.3.4.2	4.3.2	Assemble Major Frames	2
3.3.4.3	4.3.2	Assemble Major Frames	2
3.3.4.4	4.6	Create PCD File	2
3.3.4.5	4.6	Create PCD File	2
3.3.4.5	4.3.3	Build PCD Cycles	2
3.3.4.7	4.4.3	Determine WRS Scene Coordinates	2

System Requirement Number	Software Requirement Number	Software Requirement Name	Build
3.3.4.8	5.4.1	Collect Scene Data	2
3.3.4.8	5.4.2	Generate Cloud Cover Assessment	3
3.3.4.9	5.4.2	Generate Cloud Cover Assessment	3
3.3.4.10	5.4.2	Generate Cloud Cover Assessment	3
3.3.4.11	6.2	Generate Metadata	3
3.3.4.12	6.2	Generate Metadata	3
3.3.4.13	6.2	Generate Metadata	3
3.3.4.14	6.2	Generate Metadata	3
3.3.4.15	6.2	Generate Metadata	3
3.3.4.16	6.2	Generate Metadata	3
3.3.5.1	7.2	Send DAN	2
3.3.5.2	7.4	Transfer Files	2
3.3.5.3	7.3	Receive DTA	2
3.3.5.4	7.6	Delete LPS Files	3
3.3.5.4	7.7	Retain LPS Files	3
3.3.5.5	7.6	Delete LPS Files	3
3.3.5.6	7.7	Retain LPS Files	3
3.3.5.7	7.5	Generate Transfer Summary Report	3
3.3.6.1	2.1	Validate RDP Parameters	3
3.3.6.1	3.1	Validate MFP Parameters	3
3.3.6.1	5.1	Validate IDP Parameters	3
3.3.6.1	6.1	Process LPS Directive	2
3.3.6.1	6.6	Modify Contact Schedule	3
3.3.6.2	2.4	Decode BCH	1
3.3.6.2	2.6	Compute BER	3
3.3.6.2	2.7	Generate Return Link QA Report	3
3.3.6.2	2.2.1	Perform SCLF Sync	1
3.3.6.2	2.3.1	Perform CRC Check	1
3.3.6.2	2.3.2	Perform RS_EDAC Check	1
3.3.6.3	3.7	Generate Level 0R QA Report	3
3.3.6.3	6.1	Process LPS Directive	2
3.3.6.3	6.4	Display or Print LPS Report	3
3.3.6.4	6.1	Process LPS Directive	2
3.3.6.4	6.4	Display or Print LPS Report	3
3.3.6.5	6.1	Process LPS Directive	2
3.3.6.5	6.4	Display or Print LPS Report	3
3.3.6.6	5.1	Validate IDP Parameters	3
3.3.6.6	6.1	Process LPS Directive	2
3.3.6.6	6.3	Report LPS Status	2
3.3.6.6	4.3.1	Assemble Minor Frames	2
3.3.6.6	5.4.1	Collect Scene Data	2
3.3.6.6	5.4.2	Generate Cloud Cover Assessment	3
3.3.6.7	5.1	Validate IDP Parameters	3
3.3.6.7	6.3	Report LPS Status	2

System Requirement Number	Software Requirement Number	Software Requirement Name	Build
3.3.6.7	4.3.1	Assemble Minor Frames	2
3.3.6.7	5.4.1	Collect Scene Data	3
3.3.6.7	5.4.2	Generate Cloud Cover Assessment	3
3.3.6.8	1.1	Receive Raw Wideband Data	3
3.3.6.8	1.2	Save Raw Wideband Data	3
3.3.6.8	1.3	Restage Raw Wideband Data	3
3.3.6.8	2.1	Validate RDP Parameters	3
3.3.6.8	6.1	Process LPS Directive	2
3.3.6.8	7.6	Delete LPS Files	3
3.3.6.8	7.7	Retain LPS Files	3
3.3.6.8	2.2.1	Perform SCLF Sync	1
3.3.6.8	2.2.2	Align Bytes	1
3.3.6.8	2.2.3	Deinvert Data	1
3.3.6.8	2.2.4	Perform PN Decode	1
3.3.6.9	1.1	Receive Raw Wideband Data	3
3.3.6.9	6.1	Process LPS Directive	2
3.3.6.9	6.7	LPS System Control	3
3.3.6.9	2.2.1	Perform SCLF Sync	1
3.3.6.9	2.2.2	Align Bytes	1
3.3.6.9	2.2.3	Deinvert Data	1
3.3.6.9	2.2.4	Perform PN Decode	1
3.3.6.10	TBM	Moving Window Display	3
4.1.1		[DELETED]	
4.1.2		[DELETED]	
4.1.3	TBM	Process 250 Scenes per Day	3
4.1.4	TBM	Save & Process within 16 Hours of Receipt	3
4.1.5	TBM	Reprocess 10% of daily volume	3
4.1.6	2.1	Validate RDP Parameters	3
4.1.6	2.2.1	Perform SCLF Sync	1
4.1.6	2.2.2	Align Bytes	1
4.1.6	2.2.3	Deinvert Data	1
4.1.6	2.2.4	Perform PN Decode	1
4.1.6	2.3.1	Perform CRC Check	1
4.1.6	2.3.2	Perform RS_EDAC Check	1
4.1.6	2.3.3	Discard Fill CADUs	1
4.1.6	2.4	Decode BCH	1
4.1.6	2.5	Annotate VCID Change	1
4.1.6	2.6	Compute BER	3
4.1.6	2.7	Generate Return Link QA Report	3
4.1.7		[ALLOCATED TO HARDWARE]	
4.1.8		[ALLOCATED TO HARDWARE]	
4.1.9	TBM	Maintain Throughput at 10**-5 BER	3
4.1.10	TBM	110% Throughput Capability	3
4.1.11	TBM	125 % RAM Capacity	3

System Requirement Number	Software Requirement Number	Software Requirement Name	Build
4.1.12	TBM	125 % Peripheral Storage Capacity	3
4.1.13	TBM	110% I/O Bandwidth	3
4.2.1	TBM	LGS/LPS Xfer at 75 Mbps	1
4.2.2		[ALLOCATED TO SYSTEM SOFTWARE]	
4.3.1	TBM	Receive contacts 14 minutes	1
4.3.2	TBM	Store 3 contact periods	1
4.3.3	2.2.1	Perform SCLF Sync	1
4.3.3	2.2.2	Align Bytes	1
4.3.3	2.2.3	Deinvert Data	1
4.3.3	2.2.4	Perform PN Decode	1
4.3.4	5.2.1	Reduce Image by Subsamples	3
4.3.4	5.2.2	Reduce Image by Wavelets	3
4.3.5	4.4.3	Determine WRS Scene Coordinates	3
TBM	3.4.2	Extract Major Frame Time	1
TBM	3.6.2	Create Calibration File	2
TBM	3.8	Collect Quality and Accounting	1
TBM	4.1	Validate PCD Parameters	3
TBM	4.2.2	Determine Majority Info Word	2
TBM	4.4.2	Compute Latitude And Longitude	2
TBM	4.4.4	Compute Horizontal Display Shift	3
TBM	4.4.5	Calculate Sun Position	3
TBM	4.4.6	Report Scene Info	3
TBM	7.1	Generate DAN	1
TBM	7.8	Control Send DAN	3
TBM	TBM	Capture Data Automatically	3
TBM	TBM	Invoke Level 0R Processing Automatically	3
TBM	TBM	Save to 30-day Store Automatically	3
TBM	TBM	Generate Browse for Partial Scenes	3
TBM	TBM	Switch Between Test/Ops Configurations	3
TBM	TBM	Propagate LPS Parameters across Strings	3
TBM	TBM	Check Parameter Consistency across Strings	3
TBM	TBM	Check Disk Space Available before Level 0R	3
TBM	TBM	Ingest Electronic Contact Schedule	3
TBM	TBM	Handle Tape Stacker	3
TBM	TBM	Restrict Parameter Update Privileges	3
TBM	TBM	Perform Contrast Stretch on Browse	3
TBM	TBM	Backup Database	3

Appendix B — Development Area Lines of Code Estimates

	Est LOC	B1	B2	B3
Analysis Tools	6300	2200	3600	500
Database	1547	384	328	835
Globals	8023	6393	1240	390
Raw Data Capture Subsystem (RDCS)	3213	893	0	2320
Raw Data Processing Subsystem (RDPS)	6321	6321	0	0
Major Frame Processing Subsystem (MFPS)	6272	3802	1730	740
Payload Correction Data Subsystem (PCDS)	8335	0	6360	1975
Image Data Processing Subsystem (IDPS)	3950	0	1500	2450
Management and Control Subsystem (MACS)	5567	817	1620	3130
Landsat Data Transfer Subsystem (LDTS)	5955	560	3895	1500
Net Total	55483	21370	20273	13840
CCRs (20%)	8329		4274	4055
Total	63812	21370	24547	17895
		34%	38%	28%

Appendix C — Mapping of Units to Builds

Table C-1: Globals Units-to-Builds Mapping (1 of 2)

	B1	B2	B3
lps_1750AToDouble		100%	
lps_CalDate		100%	
lps_CaptureIsRunning	100%		
lps_ComputeEpoch		100%	
lps_DayOfYear		100%	
lps_db_Commit	100%		
lps_db_Connect	100%		
lps_db_Disconnect	100%		
lps_db_ErrorMessage	100%		
lps_db_GetLPSConfiguration	100%		
lps_db_GetRDIInfo		100%	
lps_db_GetSubIntvInfo		100%	
lps_db_InsertFileInfo	100%		
lps_db_Rollback	100%		
lps_EpochBreakDown		100%	
lps_FIFOClose		100%	
lps_FIFOOpen		100%	
lps_FIFOREceive		100%	
lps_FIFOSend		100%	
lps_FileNameCreate	100%		
lps_getopt	100%		
lps_GetPIDFileName	100%		
lps_LogMessage	100%		
lps_MonthDay		100%	
lps_ParseFileName	100%		
lps_ParseOptions	100%		
lps_ProcessChildStatus	100%		
lps_ProcessInit	100%		
lps_ProcessStartChild	100%		
lps_RsrcAlloc	80%	20%	
lps_RsrcAllocFIFO		100%	
lps_RsrcAllocShm	100%		
lps_RsrcDealloc	80%	20%	
lps_ShmAddListTail	60%		40%
lps_ShmAddtoBlock			100%
lps_ShmBlocktoAddr			100%
lps_ShmClose	100%		
lps_ShmCreate	65%		35%
lps_ShmCreateSemaphore	100%		
lps_ShmGetRdBlk	100%		
lps_ShmGetWrBlk	100%		
lps_ShmOpen	65%		35%
lps_ShmOpenSemaphore	100%		
lps_ShmPutRdBlk	100%		

Table C-1: Globals Units-to-Builds Mapping (2 of 2)

	B1	B2	B3
lps_ShmPutWrBlk	100%		
lps_ShmRemListHead	60%		40%
lps_ShmRemListTail	60%		40%
lps_ShmRemove	100%		
lps_TimeAdd	100%		
lps_TimeAssignValue2Struct	100%		
lps_TimeCompare	100%		
lps_TimeCompareTol		100%	
lps_TimeDiff	100%		
lps_TimeDivide	100%		
lps_TimeGetCurrentTime	100%		
lps_TimeMultiply	100%		
lps_TimeString2Struct	100%		
lps_TimeStringCheck	100%		
lps_TimeStruct2String	100%		
lps_TimeStructCheck	100%		
lps_ValidateRDCOutfileName	100%		

Table C-2: Database Units-to-Builds Mapping

	B1	B2	B3
Table/Script Generation	45%	39%	16%
Indexing			100%
Performance			100%
Fine Tuning			100%

Table C-3: MACS Units-to-Builds Mapping (1 of 2)

	B1	B2	B3
mac_ACAcceptSignal			100%
mac_ACSleep			100%
mac_AutoCapture			100%
mac_db_ACGetNextCaptureInfo			100%
mac_db_ACRegisterCapture			100%
mac_db_GetRDCFilename	100%		
mac_db_IASUpdateParm			100%
mac_db_Initialize	90%		10%
mac_db_MetaDataGetAScene		100%	
mac_db_MetaDataGetBandsPresent		20%	80%
mac_db_MetaDataGetSubIntv		100%	
mac_db_RegL0RPID	100%		
mac_db_RollbackL0R	100%		
mac_db_ShutdownLPS	100%		
mac_db_UnregL0RPID	100%		
mac_ExamLPSJournal		100%	
mac_FilterMsg		100%	
mac_FilterMsgAwk		100%	
mac_GenQAResult			100%
mac_IngestIASParms			100%
mac_LPS	90%		10%
mac_MainAbortL0R	100%		
mac_MainActivateChildProcesses	100%		
mac_MainCleanupL0R	100%		
mac_MainInitL0R	100%		
mac_MainRollbackL0R	100%		
mac_MainShutdownL0R	100%		
mac_MainShutdownLPS	100%		
mac_MainStartL0R	100%		
mac_MainStopL0R	100%		
mac_MainWaitForL0R	100%		
mac_MetaDataGen		100%	
mac_MetaDataGenFileHeadDesc		100%	
mac_MetaDataGenScene		100%	
mac_MetaDataGenSubIntv		100%	
mac_MetaDataWriteAScene		100%	
mac_MetaDataWriteSubIntv		100%	
mac_OpsMsg		100%	
mac_ui_ContSchedule			100%
mac_ui_DANTransState			100%
mac_ui_DataRcvSum			100%
mac_ui_DeleteFileSet			100%
mac_ui_ExamLPSJournal			100%
mac_ui_FileTransSum			100%
mac_ui_IngestIASParms			100%
mac_ui_Level0RQA			100%

Table C-3: MACS Units-to-Builds Mapping (2 of 2)

	B1	B2	B3
mac_ui_LPSConfig			100%
mac_ui_LPSParms			100%
mac_ui_LPSQA			100%
mac_ui_LPSThres			100%
mac_ui_MainMenu	100%		
mac_ui_MainShutdown	100%		
mac_ui_OpsMsg	100%		
mac_ui_ResendDAN		100%	
mac_ui_RetainFileSet		100%	
mac_ui_SendData		100%	
mac_ui_StartBackup		100%	
mac_ui_StartCapture	100%		
mac_ui_StartL0R	100%		
mac_ui_StartRestage		100%	
mac_ui_StartStopAutoCapture		100%	
mac_ui_StartStopDDNServer	100%		
mac_ui_StopBackup		100%	
mac_ui_StopCapture	100%		
mac_ui_StopL0R	100%		
mac_ui_StopRestage		100%	
TBD automatic check for disk space unit(s)		100%	
TBD automatic copy to tape unit(s)		100%	
TBD automatic level 0R unit(s)		100%	
TBD database backup unit(s)		100%	
TBD electronic schedule ingest unit(s)		100%	
TBD parameter propagation unit(s)		100%	
TBD tape label generation menu item unit(s)		100%	
TBD test configuration unit(s)			100%

Table C-4: RDCS Units-to-Builds Mapping

	B1	B2	B3
rdc_CalcAcctInfo			100%
rdc_db_WriteAcctToDb			100%
rdc_db_WriteOnLineFlag	100%		
rdc_DecodeArg	50%		50%
rdc_DelsolateProcess			100%
rdc_DeleteRDCFiles			100%
rdc_GenDataRcvSumReport			100%
rdc_GenLabel			100%
rdc_GetTermFileName	100%		
rdc_HPDIFunctions			100%
rdc_Init	80%		20%
rdc_IsolateProcess			100%
rdc_Main	100%		
rdc_MainCapture	100%		
rdc_MizarFunctions	100%		
rdc_PrintLabel			100%
rdc_RestageCptr			100%
rdc_ResumeProcess			100%
rdc_Save			100%
rdc_SetOnLineFlag			100%
rdc_ShutDown	50%		50%
rdc_StopSaveRestage			100%
rdc_SuspendProcess			100%
rdc_TermRestageSig			100%
rdc_TermSaveSig			100%
rdc_TestData			100%
rdc_TestDataTrans			100%
rdc_UpdateDb			100%
rdc_UpdRDCAcct			100%
rdc_WritetoAcctFile			100%

Table C-5: RDPS Units-to-Builds Mapping

	B1	B2	B3
fs_align_frames_n_output	100%		
fs_frame_sync	100%		
fs_get_stats	100%		
fs_initialize	100%		
fs_match_fsp	100%		
fs_match_fsp_slip	100%		
fs_terminate	100%		
rdp_BCHBuildMsnQuadTable	100%		
rdp_BCHCorrectBitsMsn	100%		
rdp_BCHCorrectBitsPtr	100%		
rdp_BCHDecode	100%		
rdp_BCHMsnCalcSyndromes	100%		
rdp_BCHMsnChienSearch	100%		
rdp_BCHMsnDecTree	100%		
rdp_BCHMsnDivide	100%		
rdp_BCHPtrCalcSyndromes	100%		
rdp_BCHPtrChienSearch	100%		
rdp_BCHPtrDecTree	100%		
rdp_BCHPtrDivide	100%		
rdp_BCHReduceToQuadMsn	100%		
rdp_BCHReduceToQuadPtr	100%		
rdp_BCHTransposeCadu	100%		
rdp_CRCCheck	100%		
rdp_CRCChecksum	100%		
rdp_CRCGenTable	100%		
rdp_db_GetThresholds	100%		
rdp_db_GetThresholds	100%		
rdp_db_PutRDPAcctInfo	100%		
rdp_Main	100%		
rdp_MainExtractCADU	100%		
rdp_MainFSync	100%		
rdp_MainGenerateOutput	100%		
rdp_MainInit	100%		
rdp_MainObtainData	100%		
rdp_MainSetVCIDAnnotations	100%		
rdp_MainShutdown	100%		
rdp_MainStoreFailedCADUs	100%		
rdp_MainTranToShared	100%		
rdp_MainValidateCADU	100%		
rdp_RSCheck	100%		

Table C-6: MFPS Units-to-Builds Mapping (1 of 2)

	B1	B2	B3
mfp_AlignBands		100%	
mfp_CalDefSwath		100%	
mfp_CalDetachSwath		100%	
mfp_CallInit		100%	
mfp_CallL0rExtract		100%	
mfp_CalWriteFile		100%	
mfp_ChckSplitMnf		100%	
mfp_COMPAREEOL	80%	20%	
mfp_CondenseDataGrp	80%	20%	
mfp_db_ExtractStopTime	100%		
mfp_db_GetParms			100%
mfp_db_GetThres			100%
mfp_db_InsertMjfQa			100%
mfp_db_InsertSubIntv	100%		
mfp_db_InsertSubQa	100%		
mfp_db_UpdateSubIntv	100%		
mfp_Deint			100%
mfp_ExtractMnf	80%	20%	
mfp_FillBand6			100%
mfp_FillMostBands			100%
mfp_FindMjfEol	80%	20%	
mfp_FindMjfSync	80%	20%	
mfp_L0RFilesGen	100%		
mfp_Main	70%	20%	10%
mfp_MainAdd2Set	100%		
mfp_MainBandGen			100%
mfp_MainCheckTcFrames	100%		
mfp_MainChkMissing	100%		
mfp_MainChkSeq	100%		
mfp_MainCleanup	60%	40%	
mfp_MainColVcdQA	100%		
mfp_MainCompScanDir	100%		
mfp_MainDetermineSub	100%		
mfp_MainDetermineTimeRange	100%		
mfp_MainEocNoMjf			100%
mfp_MainEstimateTime	100%		
mfp_MainExtractTime	100%		
mfp_MainFillMissMjfs			100%
mfp_MainFindMjfStart	100%		
mfp_MainGenSubIntv	100%		
mfp_MainGetAvInfo	100%		
mfp_MainGroupTC	100%		
mfp_MainIdentifyMjfSet	100%		
mfp_MainInit	60%	30%	10%
mfp_MainInitVcduSets	100%		
mfp_MainMjfTime	100%		

Table C-6: MFPS Units-to-Builds Mapping (2 of 2)

	B1	B2	B3
mfp_MainPcdExtract		100%	
mfp_MainPcdStatusProc		100%	
mfp_MainQACalcMjf			100%
mfp_MainQACalcSub	100%		
mfp_MainQASubGen	80%		20%
mfp_MainQAThrTest			100%
mfp_MainQAZeroData	100%		
mfp_MainQAZeroMjf			100%
mfp_MainRelShmBlk	80%	20%	
mfp_MainStatusExtract		100%	
mfp_MainTCMnfSync	100%		
mfp_MainValidateMjf	100%		
mfp_MainValidateTime	100%		
mfp_MainValVcidChg	100%		
mfp_MainVerifySpacecraftId		100%	
mfp_MscdL0rExtract	100%		
mfp_MscdWriteFile	100%		
mfp_VerifyMjf	80%	20%	

Table C-7: PCDS Units-to-Builds Mapping (1 of 3)

	B1	B2	B3
pcd_ConstructTime		100%	
pcd_db_ExtractStopTime		100%	
pcd_db_GetFirstWrsScene		100%	
pcd_db_GetNextWrsScene		100%	
pcd_db_GetPrevWrsScene			100%
pcd_db_GetTimeOffsets			100%
pcd_db_GetValidParms			100%
pcd_db_GetValidSceneParms			100%
pcd_db_GetValidThres			100%
pcd_db_ReportSceneInfo		100%	
pcd_db_StoreAcctInfo		100%	
pcd_db_StoreBandsPresent		100%	
pcd_db_StoreMjfAcct		100%	
pcd_JulDate		100%	
pcd_LagrangeInt		100%	
pcd_Main		100%	
pcd_MainAcceptMinorFrames		100%	
pcd_MainAdjustTime		100%	
pcd_MainAttitudeInt		100%	
pcd_MainBuildCycle		100%	
pcd_MainBuildHdfRec		100%	
pcd_MainBuildMajorFrames		100%	
pcd_MainBuildMinorFrames		100%	

Table C-7: PCDS Units-to-Builds Mapping (2 of 3)

	B1	B2	B3
pcd_MainCheckDataPoints	100%		
pcd_MainCleanUp	80%	20%	
pcd_MainComputeGHA	100%		
pcd_MainComputeHds		100%	
pcd_MainComputeLat	100%		
pcd_MainComputeLookPoint	100%		
pcd_MainComputePosition	100%		
pcd_MainComputeSceneCorners	100%		
pcd_MainConstructCycles	100%		
pcd_MainCreatePcdFile	100%		
pcd_MainDetermineMissingWords	100%		
pcd_MainDeterminePcdWord	100%		
pcd_MainDetermineScenes	100%		
pcd_MainDetSceneDescription	100%		
pcd_MainEphemerisInt	100%		
pcd_MainEstimateCycleTime	100%		
pcd_MainEstimateMissingCycles	100%		
pcd_MainEvalMnfQuality	100%		
pcd_MainExitHandler	100%		
pcd_MainExtractAds	100%		
pcd_MainExtractAdsTemp	100%		
pcd_MainExtractCycleInfo	100%		
pcd_MainExtractGyroData	100%		
pcd_MainExtractMjfOneWord72	100%		
pcd_MainExtractMjfThreeWord72	100%		
pcd_MainExtractMjfTwoWord72	100%		
pcd_MainExtractMjfZeroWord72	100%		
pcd_MainExtractSceneParms	100%		
pcd_MainExtractWord72	100%		
pcd_MainExtractWords	100%		
pcd_MainFillMajorFrame	100%		
pcd_MainFillPcdCycle	100%		
pcd_MainFormatPcdCycle	100%		
pcd_MainFormatWords	100%		
pcd_MainGetNutAng	100%		
pcd_MainInit	80%	20%	
pcd_MainLocateSyncPatterns	100%		
pcd_MainPcdFileSetup	100%		
pcd_MainPerformMajorityVote	100%		
pcd_MainProcMajorFrame	100%		
pcd_MainReportScenes	100%		
pcd_MainSunAzimuthElev		100%	
pcd_MainSunPos		100%	
pcd_MainUpdateSubIntv	100%		
pcd_MainUpdateSubIntvStats	100%		

Table C-7: PCDS Units-to-Builds Mapping (3 of 3)

	B1	B2	B3
pcd_MainVerifyCycle		100%	
pcd_MainVerifyCycleTime		100%	
pcd_MainWriteCycleToFile		100%	
pcd_TwoCompConv		100%	
TBD browse for partial scenes units (1135 DSI)			100%

Table C-8: IDPS Units-to-Builds Mapping

	B1	B2	B3
idp_ACCA			100%
idp_ACCAAssessScene			100%
idp_ACCAInit			100%
idp_ACCASceneCalc			100%
idp_ACCAShutdown			100%
idp_BandClose	100%		
idp_BandFillFile	100%		
idp_BandFindScanNum	100%		
idp_BandFindScene	100%		
idp_BandInit	100%		
idp_BandMain	100%		
idp_BandReadMF	100%		
idp_Browse		100%	
idp_BrowseCreateFile		100%	
idp_BrowselInit		100%	
idp_BrowseSceneProc		100%	
idp_BrowseShutdown		100%	
idp_BrowseSubs		100%	
idp_BrowseWave		100%	
idp_db_BandUpdate	100%		
idp_db_GetFillValue		100%	
idp_db_InsertScores		100%	
idp_HDF	100%		
idp_Main	100%		
idp_MainAbort	100%		
idp_MainGlobal	100%		
idp_MainInit	100%		
idp_MainProcessChildSignal	100%		
idp_MainShutdown	100%		
TBD contrast stretch unit (50 DS)			100%
TBD moving window display units (1000 DS)			100%

Table C-9: LDTs Units-to-Builds Mapping (1 of 2)

	B1	B2	B3
ldt_AcceptClient*		100%	
ldt_Broadcast*		100%	
ldt_CreateDAN	100%		
ldt_CreateServer*		100%	
ldt_create_client*		100%	
ldt_danProcessLongDAA		100%	
ldt_danProcessShortDAA		100%	
ldt_day_to_month*	100%		
ldt_danRcvDAA		100%	
ldt_db_InsertDANInfo	50%	50%	
ldt_db_InsertFileGroupInfo		100%	
ldt_db_InsertFileSetInfo		100%	
ldt_db_ExtrDANStruct	80%	20%	
ldt_db_GenftsReport			100%
ldt_db_GetContactFileNames			100%
ldt_db_GetDANContactInfo		100%	
ldt_db_GetDANXferState		100%	
ldt_db_GetFileGrpInfo		100%	
ldt_db_GetFileSubIntvId		100%	
ldt_db_GetIngestedFiles			100%
ldt_db_GetLDTParm		100%	
ldt_db_GetRetentionState			100%
ldt_db_GetSubintv	100%		
ldt_db_GetSubIntvList		100%	
ldt_db_GetSuspDANs			100%
ldt_db_GetTimedOutDANs			100%
ldt_db_SetLastXmitTime			100%
ldt_db_UpdateDANInfo		100%	
ldt_db_UpdateFileGrpDAA		100%	
ldt_db_UpdateFileGrpXferStat		100%	
ldt_db_UpdateFileSetDAA		100%	
ldt_db_UpdateFileSetXferStat		100%	
ldt_db_UpdateFileXferStat		100%	
ldt_db_UpdateLDTParm		100%	
ldt_db_UpdRetentionState			100%
ldt_db_UpdSuspState			100%
ldt_ddnAuthentReq		100%	
ldt_ddnGenAuthRes		100%	
ldt_ddnGenDDA		100%	
ldt_ddnProcessDDN		100%	
ldt_ddnProcTermSig		100%	
ldt_ddnSendDDA		100%	
ldt_ddnVerifyLongDDN		100%	
ldt_ddnVerifyOriginator*		100%	
ldt_ddnVerifyShortDDN		100%	
* Reused unit with less than 25% modification			

Table C-9: LDTs Units-to-Builds Mapping (2 of 2)

	B1	B2	B3
ldt_DeleteFiles			100%
ldt_delRemoveFiles			100%
ldt_establish_client*		100%	
ldt_free_dan*	100%		
ldt_GenFTS			100%
ldt_GenftsDiskUsage			100%
ldt_GetCurrentEDCTime		100%	
ldt_insert_time_stamp*	100%		
ldt_keyscan_Id*		100%	
ldt_next_string*		100%	
ldt_PackHeader*		100%	
ldt_put_string*	100%		
ldt_RcvDDN		100%	
ldt_read_dan_info*		100%	
ldt_ReadSocket*		100%	
ldt_RetainFiles			100%
ldt_RsndSuspDANs			100%
ldt_save_messages*		100%	
ldt_SelectSocket		100%	
ldt_SendDAN		100%	
ldt_send_validation_req*		100%	
ldt_SetSockOpts*		100%	
ldt_SocketResponse		100%	
ldt_start_client_n_clock*		100%	
ldt_StopDDN		100%	
ldt_string_fail*	100%		
ldt_TermSendDAN		100%	
ldt_TimeDiff		100%	
ldt_UnpackHeader*		100%	
ldt_WriteSocket*		100%	
ldt_write_dan_info	100%		
* Reused unit with less than 25% modification			

Table C-10: Analysis Tools Units-to-Builds Mapping

	B1	B2	B3
Band File Dump		100%	
Browse File Dump			100%
Calibration File Dump		100%	
Database Table Dump	100%		
Input File Dump (Sync Dump)	100%		
LP DAAC Simulator/DESIM		100%	
Metadata File Dump		100%	
MFPS to IDPS Simulator		100%	
MFPS to PCDS Simulator		100%	
MSCD File Dump	100%		
PCD Database Load		100%	
PCD File Dump		100%	
RDPS to MFPS Simulator	100%		
Shared Memory Dump	100%		

Appendix D— Acronyms and Abbreviations

BCH	Bose-Chaudhuri-Hocquenghem (error detection and correction)
CADU	Channel Access Data Unit
CCR	Configuration Change Request
CCSDS	Consultative Committee on Space Data Systems
CM	Configuration Management
CN莫斯	Consolidated Network Management and Operations Support
COTS	Commercial Off-the-Shelf
CRC	Cyclic Redundancy Check
DAN	Data Availability Notice
ETM+	Enhanced Thematic Mapper Plus
F&PS	Functional and Performance Specification
GSFC	Goddard Space Flight Center
GTSIM	Generic Telemetry Simulator
GUI	Graphical User Interface
IAS	Image Assessment System
IDPS	Image Data Processing Subsystem
LDTS	Landsat Data Transfer Subsystem
LGS	Landsat Ground Station
LP DAAC	Land Processes Distributed Active Archive Center
LPS	Landsat 7 Processing System
MACS	Management and Control Subsystem
MFPS	Major Frame Processing Subsystem
MJF	Major Frame
MO&DSD	Mission Operations and Data Systems Directorate
MOC	Mission Operations Center
MOSDD	Mission Operations and System Development Division
NASA	National Aeronautics and Space Administration
PCD	Payload Correction Data
PCDS	Payload Correction Data Subsystem
PN	Pseudo-random Noise
QA	Quality and Accounting

RDCS	Raw Data Capture Subsystem
RDPS	Raw Data Processing Subsystem
RS-EDAC	Reed-Solomon Error Detection and Correction
SCLF	Search, Check, Lock, Flywheel
SMP	Systems Management Policy
TBM	To Be Mapped
VCID	Virtual Channel Identifier
WRS	Worldwide Reference System